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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/812,956	03/27/2001	David Sandberg	2380-290	5278

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EXAMINER	
ODOM, CURTIS B	

ART UNIT	PAPER NUMBER
2634	

DATE MAILED: 08/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/812,956	SANDBERG, DAVID	
	Examiner	Art Unit	
	Curtis B. Odom	2634	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *27 March 2001*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-6,9-23 and 26-35* is/are rejected.

7)☒ Claim(s) *7,8,24 and 25* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☒ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 March 2001* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Specification

1. The disclosure is objected to because of the following informalities:

a. On page 1, line 6, the centered heading is suggested to be changed to "BACKGROUND OF THE INVENTION".

b. On page 2, lines 12-13, the phrase "multipath sometimes" is suggested to be changed to "multipath is sometimes".

c. On page 4, line 18, the centered heading ""SUMMARY OF THE INVENTION" is suggested to be inserted.

d. On page 13, line 18 "Fig. 13" is suggested to be changed to "Fig. 12".

Appropriate correction is required.

Claim Objections

2. Claims 2, 9, 27, and 30 are objected to because of the following informalities:

a. In claim 2, line 6, the phrase "a known signal" is suggested to be changed to "a known sequence".

b. In claim 9, lines 5-6, the phrase "for a phase changes" is suggested to be changed to "for phase changes".

c. In claim 27, line 1, the word "Apparatus" is suggested to be changed to "An apparatus".

d. In claim 30, line 14, the phrase "The in claim 31" is suggested to be changed to "The apparatus in claim 28".

Appropriate correction is required.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

4. Claims 6, 9, 17, 18, 23, and 26 are rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention. Claims 6 and 18 recite the limitation "filtering an unknown sequence in the received signal using the channel estimate to compensate for phase changes caused by Rayleigh fading". Claims 9 and 17 recite the claim limitation "wherein the channel estimate filters the (unknown sequence) received signal to compensate for a phase change caused by Rayleigh fading". Claims 23 and 26 recite the claim limitation "wherein the channel estimator is configured to filter an unknown sequence in the received signal to compensate for phase changes caused by Rayleigh fading". However, after reviewing the specification, particularly Fig. 11 and page 12, line 7-page 13, line 17, it is

the understanding of the examiner that the filtering operation from which these claims make reference is not a filtering operation. Rather, it is a mixing operation which takes place in order to compensate for the phase changes caused by the fading channel (page 13, lines 1-17 of the instant specification). There is no filtering operation which takes place in which a signal component of the signal in filtered or removed to create a phase-compensated signal. Rather, the phase of the signal is corrected using a mixing operation, not a filtering operation. Thus, the unknown sequence is never filtered using the channel estimate or channel estimator and the channel estimate does not filter the unknown sequence. However, there is reference to a filtering operation using the channel estimate (Fig. 11, page 13, line 1-8), but the filtering operation involves using known sequence of the received signal, not the unknown sequence of the received signal.

5. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

6. Claims 11-18 and 28-34 (assuming claims 29-34 depend on claim 28) are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to define each variable of each equation (see p_k and p_{k+1} in claims 11 and 28).

Claim Rejections - 35 USC § 102

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –

(e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1-5, 10, 19-22 and 27 are rejected under 35 U.S.C. 102(e) as being anticipated by Molnar et al. (U. S. Patent No. 6, 680, 969)

Regarding claim 1, Molnar et al. discloses a method, comprising:

detecting a signal (Fig. 4, column 5, lines 13-23) received over a Rayleigh fading channel (column 9, lines 12-22), and

estimating (Fig. 5, column 6, lines 22-53) a Doppler spread associated with the Rayleigh fading channel based on an autocorrelation function of a sequence of complex channel estimates (column 5, lines 24-35).

Regarding claim 2, which inherits the limitations of claim 1, Molnar et al. discloses wherein the received signal includes a known signal (known pilot code, column 5, lines 24-35), the method further comprising:

obtaining the complex channel estimates (column 5, lines 24-35) from the known sequence (known pilot code in received signal) in a first sampling interval and the known sequence (other codes carrying information) in a second sampling interval.

Regarding claim 3, which inherits the limitations of claim 2, Molnar et al. discloses complex-conjugating a sequence of complex channel estimates obtained from the known sequence in a first sampling interval, and correlating the complex-conjugated sequence with a sequence of complex channel estimates obtained from a second sampling interval (column 5, lines 24-35).

Regarding claim 4, which inherits the limitations of claim 2, Molnar et al. discloses compensating the known sequence for a frequency offset (column 7, lines 11-50).

Regarding claim 5, which inherits the limitations of claim 4, Molnar et al. discloses the frequency offset is determined using a correlation of the known sequence ii the received signal (column 7, lines 11-50), wherein the frequency offset is the rotation of the channel estimates and the channel estimates are found using a correlation of the known sequence.

Regarding claim 10, Molnar et al. discloses a method, comprising:

sampling (Fig. 4, block 23c, column 4, lines 33-36 and column 5, lines 8- 23) a signal with a known sequence received over a Rayleigh fading channel (column 9, lines 12-23), and

calculating (Fig. 5, column 6, lines 22-53) a Doppler spread associated with the Rayleigh fading channel by autocorrelating a sequence of complex channel estimates obtained from the known sequence in a first sampling interval and the known sequence in a second sampling interval.

Regarding claim 19, Molnar et al. discloses an apparatus for use in a receiver, comprising:

a detector (Fig. 4, column 5, lines 13-23) configured to detect a signal with a known sequence received over a Rayleigh fading channel (column 9, lines 12-22) associated with a communication with a transmitter, and

a Doppler spread estimator (Fig. 5, column 6, lines 22-53) configured to estimate a Doppler spread associated with the Rayleigh fading channel including an autocorrelator configured to calculate an autocorrelation function of a sequence of complex channel estimates determined using the known sequence (column 5, lines 24-35).

Regarding claim 20, which inherits the limitations of claim 19, Molnar et al. the complex channel estimates are obtained (column 5, lines 24-35) from the known sequence (known pilot code in received signal) in a first sampling interval and the known sequence (other codes carrying information) in a second sampling interval.

Regarding claim 21, which inherits the limitations of claim 20, Molnar et al. discloses a frequency offset compensator configured to compensate the known sequence for a frequency offset (column 7, lines 11-50).

Regarding claim 22, which inherits the limitations of claim 21, Molnar et al. discloses the frequency offset compensator is configured to determine the frequency offset using a correlation of the known sequence in the received signal (column 7, lines 11-50), wherein the frequency offset is the rotation of the channel estimates and the channel estimates are found using a correlation of the known sequence (column 5, lines 24-35).

Regarding claim 27, Molnar discloses an apparatus, comprising:

means for sampling (Fig. 4, block 23c, column 4, lines 33-36 and column 5, lines 8- 23) a signal with a known sequence received over a Rayleigh fading channel (column 9, lines 12-23), and

means for calculating (Fig. 5, column 6, lines 22-53) a Doppler spread associated with the Rayleigh fading channel using an autocorrelation function of the Rayleigh fading channel determined using the known sequence samples in the received signal.

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 35 is rejected under 35 U.S.C. 103(a) as being unpatentable over Molnar et al. (U. S. Patent No. 6, 680, 969) in view of Westman (U. S. Patent No. 6, 680, 967).

Regarding claim 35, which inherits the limitations of claim 27, Molnar discloses means for estimating the Rayleigh channel using the estimated Doppler spread (column 6, lines 22-53). Molnar et al. discloses compensating for phase error in the received signal (column 6, lines 7-21), but Molnar et al. does not disclose the estimated channel is used to compensate an unknown sequence in the received signal for phase changes error caused by Rayleigh fading.

Westman discloses means for estimating a fading channel using an estimated Doppler spread (Fig. 4, block 106, column 7, line 60-column 8, line 6, wherein the Doppler spread is the reciprocal of the coherence time of a channel (column 1, lines 31-42)), wherein the estimated channel is used to compensate an unknown sequence in the received signal for phase changes error caused by fading (Fig. 3, blocks 104, 106, 108 and 110, column 9, line 64- column 10, line 9, and column 11, lines 44-46). Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the apparatus of Molnar et al. with the teachings of Westman in order to accurately remove phase error from the received signal since

Molnar et al. states that reducing the phase error in the received signal will increase the reliability of the results of the further operations in the receiver (column 6, lines 7-21).

Allowable Subject Matter

11. Claims 7, 8, 24, and 25 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

Conclusion

12. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kransy et al. (U. S. Patent No. 6, 563, 861) discloses a Doppler spread estimation system.

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Curtis B. Odom whose telephone number is 703-305-4097. The examiner can normally be reached on Monday- Friday, 8-5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Stephen Chin can be reached on 703-305-4714. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Curtis Odom
July 27, 2004

STEPHEN CHIN
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